



# Adverse Childhood Experiences in Michigan

Findings from the 2016 Behavioral Risk Factor Survey

October 2019



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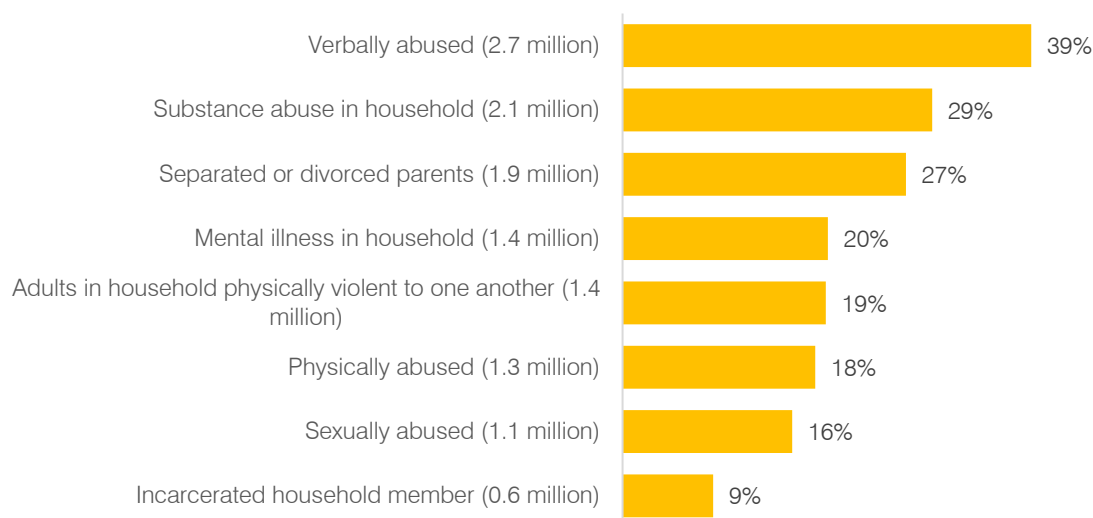
## Executive Summary

Adverse childhood experiences (ACEs) are widespread among Michigan adults, with two-thirds (66 percent) reporting one or more. These experiences are a risk factor for numerous health risk behaviors, such as smoking, and for negative health outcomes, such as depression and asthma. However, there is hope. ACEs load, or the number of ACEs an individual has, contributes to—but does not guarantee—poor health outcomes later in life. Moreover, social support may help reduce the risk of negative health outcomes, even among Michigan adults with a high ACEs load.

## Introduction

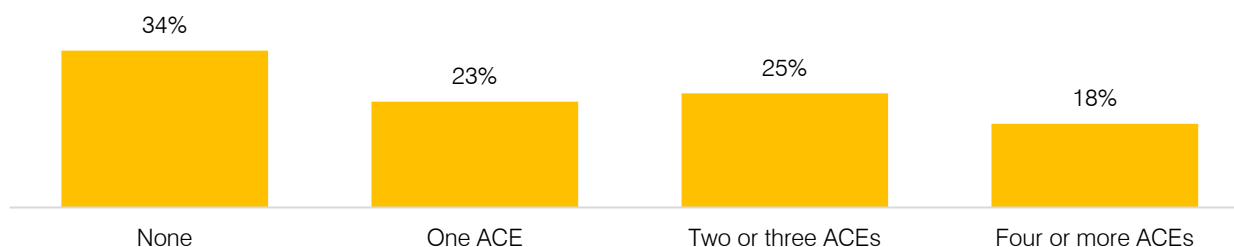
According to the Centers for Disease Control and Prevention (CDC), adverse childhood experiences are “all types of abuse, neglect, and other potentially traumatic experiences that occur to people under the age of 18.” In Michigan, eight specific ACEs (Exhibit 1) are tracked through the Behavioral Risk Factor Survey (BRFS)—an annual state-level telephone survey of adults (aged 18 and older) conducted by the Michigan Department of Health and Human Services (MDHHS) (Appendix B). The Michigan BRFS is part of a larger national Behavioral Risk Factor Surveillance System coordinated by the CDC. In 2016, the Michigan BRFS collected data from 12,024 interviews (4,797 landline respondents and 7,227 cell phone respondents). The ACEs questions were asked of one-third of this total sample. Unadjusted total responses from this sample were weighted to reflect the prevalence of each ACE across Michigan’s entire adult population.

**EXHIBIT 1. ACEs Prevalence Among Michigan Adults (2016)**



ACEs are widely prevalent among Michigan adults, with two-thirds (66 percent) reporting one or more of them (Exhibit 2). Roughly one-quarter have experienced one (23 percent) or two ACEs (25 percent); and nearly one in five (18 percent) have experienced four or more—the most severe ACEs load analyzed in this report.

## EXHIBIT 2. ACEs Load Among Michigan's Adult Population (2016)



Beyond this, ACEs are also a risk factor for various health risk behaviors and conditions. Generally, the prevalence of these behaviors and poorer health outcomes is higher among people with ACEs than those without them; this prevalence increases as someone's ACEs load—or the number of ACEs someone has—increases.

However, social support may contribute to a lower risk of negative health outcomes associated with ACEs. The prevalence of negative health outcomes among Michigan adults with high social support was 7 percent to 29 percent lower than among respondents with low social support, depending on the outcome and ACEs load (Appendix A).

The remainder of this report features the statewide prevalence of ACEs among Michigan adults, along with the prevalence of specific health risk behaviors and outcomes by ACEs load and by level of social support.

## Methodology

To identify the relationship between ACEs load, health risk behaviors, and negative health outcomes, PSC conducted two types of statistical tests: Pearson's chi-square analysis and a risk analysis. The methodology used and interpretation of these analyses are described below.

### Pearson's Chi-square Analysis

Pearson's chi-square analysis is a statistical method used to test the relationship between two categorical variables (e.g., a person's ACEs load and whether they have a specific health outcome). The method seeks to reject the null hypothesis, i.e., the hypothesis that no relationship exists between the variables in the population under observation or that the variables are independent of one another. For the purposes of this report, Pearson's chi-square analysis was used to narrow the scope and focus of the analysis to a small subset of the health outcomes most strongly associated with ACEs from among a much larger data set and other, less strongly related health outcomes. For all 14 conditions listed in Exhibit 5, there was a statistically significant relationship ( $<0.01$ ) between any ACEs exposure (having at least one ACE) and reporting the health condition, according to Pearson chi-square analysis with a significance level set at 0.05 prior to analysis.

## Risk Analysis

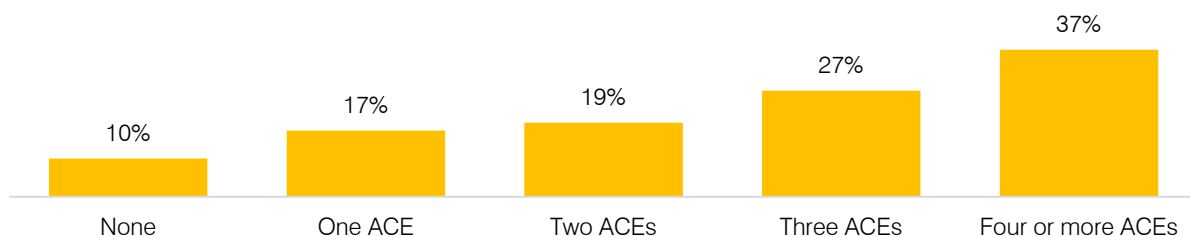
For the purposes of this report, the prevalence of a health outcome in the population exposed to one or more ACEs versus the prevalence of the same health outcome in the population with zero ACEs was used to determine the risk of the outcome occurring among people with one or more ACEs. It does not predict future health outcomes for individuals with or without ACEs, but is a means of comparing the prevalence of health outcomes between groups exposed and not exposed to ACEs. For example, we **cannot** say that “a Michigan adult with one or more ACEs is nearly 2.5 times more likely to be diagnosed with depression as an adult with no ACEs.” However, we **can** say that “the risk of depression for adults with one or more ACEs is nearly 2.5 times greater than for adults with no ACEs.”

## ACEs Load and Health Risk Behaviors

### Current Smoking

In 2016, 37 percent of Michigan adults with four or more ACEs reported smoking, compared to only 10 percent of Michigan adults with no ACEs (Exhibit 3).

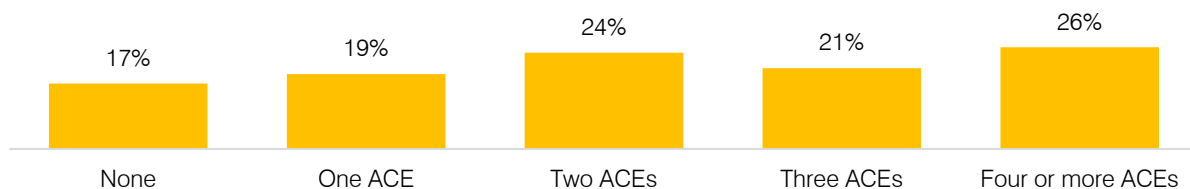
EXHIBIT 3. Current Smoking by ACEs Load



### Binge Drinking

While the association between binge drinking and ACEs appears less pronounced in Exhibit 4, the risk of binge drinking for adults with one or more ACEs is nearly 1.5 times greater than for adults with no ACEs. (Exhibit 5 provides more information on this statistic.)

EXHIBIT 4. Binge Drinking by ACEs Load



## ACEs Load and Health Outcomes

Exhibit 5 is a descriptive analysis comparing health outcomes between groups with and without ACEs, based on weighted, unadjusted totals from the 2016 Michigan BRFs (Murad and Barth 2016). It reflects the results of the Pearson's chi-square analysis and risk analysis.

### EXHIBIT 5. Health Outcomes Most Closely Associated with ACEs

Condition	Risk of Condition*	95% Confidence Interval
Diagnosed depression	2.41	2.40 to 2.42
COPD	1.83	1.82 to 1.84
Poor mental health more than half of last month	1.82	1.81 to 1.82
Ever told asthma	1.69	1.68 to 1.69
Fair or poor overall health	1.64	1.64 to 1.65
Current asthma	1.57	1.56 to 1.58
Poor physical health more than half of last month	1.31	1.30 to 1.31
Cancer	1.06	1.06 to 1.07
Cardiovascular disease	1.03	1.03 to 1.03
Arthritis	1.00	1.00 to 1.01
Diabetes	0.98	0.98 to 0.99
Stroke	0.91	0.90 to 0.92
Coronary heart disease	0.85	0.84 to 0.85
Heart attack	0.72	0.71 to 0.72

\*The prevalence of the condition among those with one or more ACEs compared to the prevalence among those with zero ACEs.

Because many factors may also affect these outcomes other than ACEs, it is important not to overinterpret these data to draw conclusions that they do not necessarily support. Those wishing to dive deeper into the relationships between these data could perform multivariate regression and analyze collinearity, interaction, effect modification, and clustering. However, for the purposes of this report, the descriptive analysis suffices to narrow our focus to health outcomes with both statistically significant relationships to ACEs and high risk. In addition, the analysis suggests the following:

- ACEs are a risk factor for a variety of health conditions. Having at least one ACE means that an individual is likely to be in poorer health.
- The risk of poor health outcomes varies by health condition. Generally speaking, the risk of mental health conditions among people with ACEs is higher than that of physical conditions; however, both are an issue.
- Finally, there seems to be a link between ACEs and breathing conditions, as evidenced by the higher risk of asthma and COPD.

The remainder of this report focuses on the six health outcomes most closely associated with ACEs:

- Diagnosed depression
- COPD
- Poor mental health
- Fair or poor overall health
- Asthma
- Poor physical health

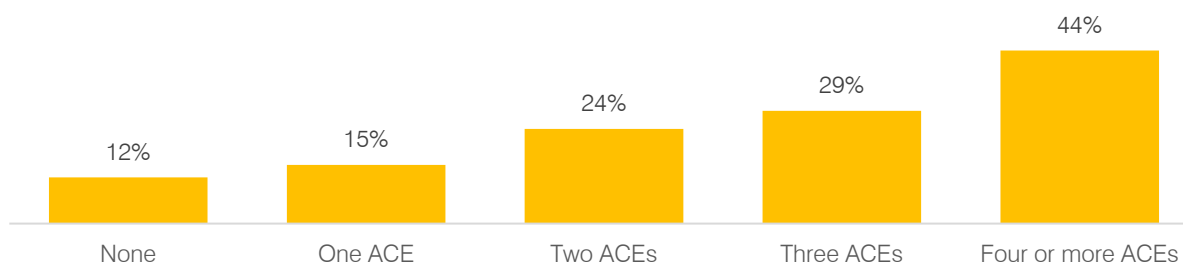
It also highlights the role of social support as a protective factor against certain health risk behaviors and poor health outcomes among people with ACEs (Appendix A).

## Diagnosed Depression

Diagnosed depression was determined by respondents' answers to the following question: "Has a doctor, nurse, or other health professional ever told you that you had a depressive disorder, including depression, major depression, dysthymia, or minor depression?" Given the prevalence of undiagnosed depression, this statistic is likely significantly lower than the actual number of Michigan adults with depression.

In 2016, 44 percent of Michigan adults with four or more ACEs had been diagnosed with depression, compared to only 12 percent of Michigan adults with no ACEs (Exhibit 6). The risk of depression for adults with one or more ACEs is nearly 2.5 times greater than for adults with none (Exhibit 5).

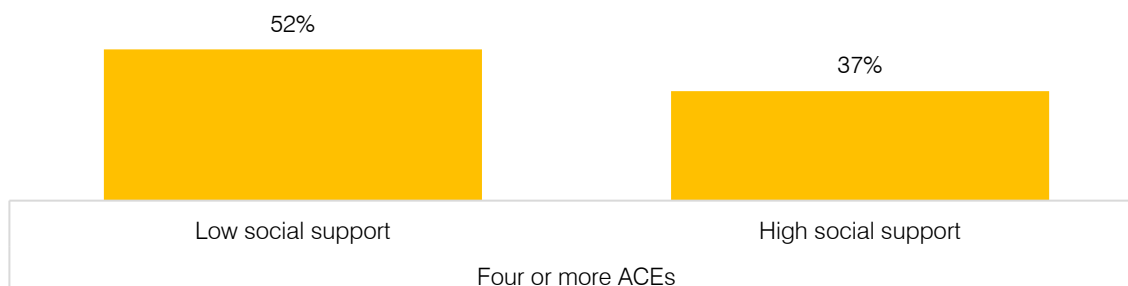
**EXHIBIT 6. Diagnosed Depression by ACEs Load**



As shown in Exhibit 7, the prevalence of diagnosed depression was 15 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across all ACEs loads, the prevalence of diagnosed depression was 10 to 21 percent lower among Michigan adults with at least one ACE and high social support than among those with low social support (depending on their ACEs load).



## EXHIBIT 7. Diagnosed Depression and Social Support

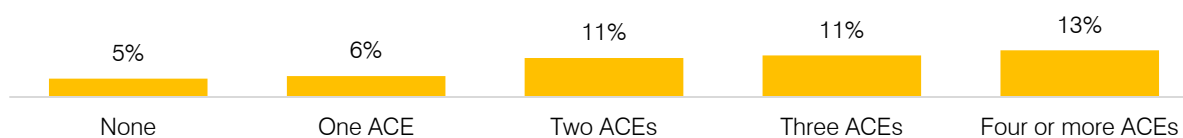


## Chronic Obstructive Pulmonary Disease

According to the COPD Foundation, “COPD is an umbrella term used to describe progressive lung diseases including emphysema, chronic bronchitis, and refractory (nonreversible) asthma. This disease is characterized by increasing breathlessness.” COPD prevalence was determined by BRFs respondents’ answers to the following question: “Has a doctor, nurse, or other health professional ever told you that you had chronic obstructive pulmonary disease or COPD, emphysema, or chronic bronchitis?”

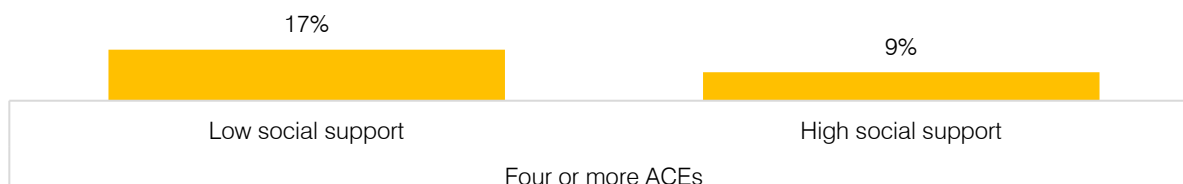
In 2016, significantly more Michigan adults with four or more ACEs had been diagnosed with COPD (13 percent) than adults with zero ACEs (5 percent) or one ACE (6 percent), as shown in Exhibit 8. The risk of diagnosed COPD for adults with one or more ACEs is nearly twice that of adults with no ACEs (Exhibit 5).

## EXHIBIT 8. COPD by ACEs Load



As shown in Exhibit 9, the prevalence of COPD was 8 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across all ACEs loads, the prevalence of COPD was 7 to 14 percent lower among Michigan adults with at least one ACE and high social support than among those with low social support (depending on their ACEs load).

## EXHIBIT 9. COPD and Social Support

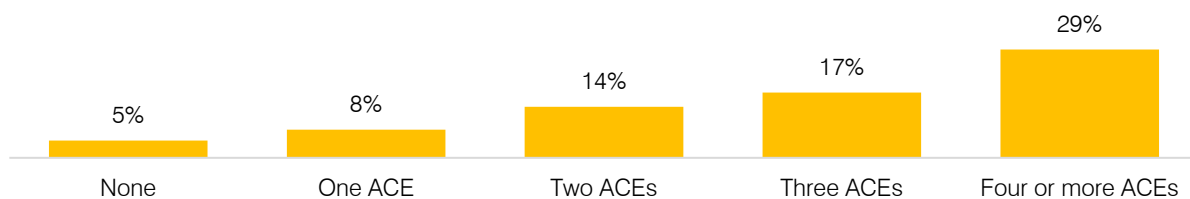


## Poor Mental Health

Poor mental health is determined by BRFs respondents' answers to the following question: "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?"

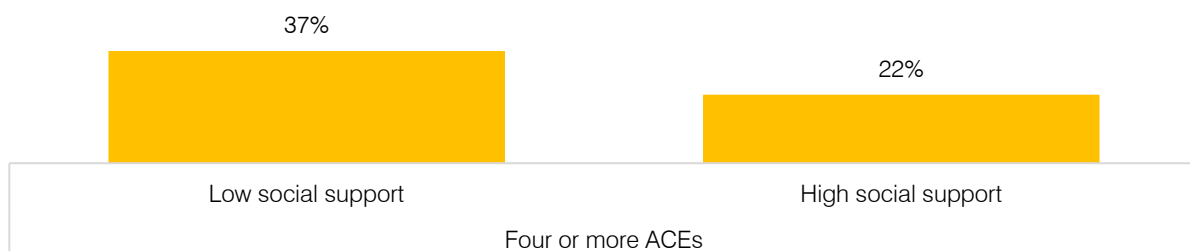
In 2016, 29 percent of Michigan adults with four or more ACEs reported poor mental health. This is significantly higher than Michigan adults reporting zero, one, or two ACEs (Exhibit 10). The risk of poor mental health for adults with one or more ACEs is nearly twice that of adults with none (Exhibit 5).

**EXHIBIT 10. Poor Mental Health by ACEs Load**



As shown in Exhibit 11, the prevalence of poor mental health was 15 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across ACEs loads, the prevalence of poor mental health among Michigan adults with at least one ACE and high social support was 11 to 21 percent lower than among those with low social support (depending on their ACEs load).

**EXHIBIT 11. Poor Mental Health and Social Support**

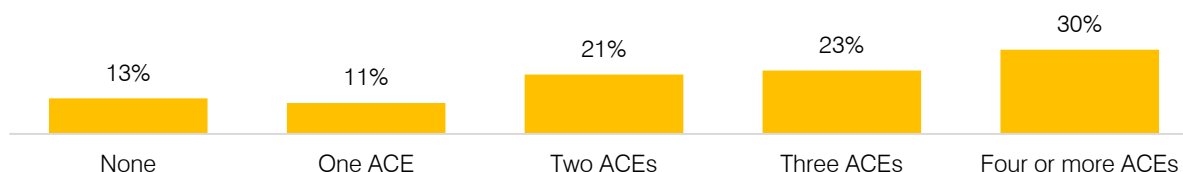


## Fair or Poor Overall Health

Fair or poor overall health is determined by BRFs respondents' answers to the following question: "Would you say that in general your health is excellent, very good, good, fair, or poor?"

In 2016, 30 percent of Michigan adults with four or more ACEs reported fair or poor health, compared to only 13 percent of Michigan adults with no ACEs (Exhibit 12). Significantly more respondents with two, three, or four or more ACEs reported fair or poor health than respondents with zero or one ACE. The risk of fair or poor overall health for adults with one or more ACEs is 1.6 times greater than for adults with none (Exhibit 5).

#### EXHIBIT 12. Fair or Poor Overall Health by ACEs Load



As shown in Exhibit 13, the prevalence of fair or poor overall health was 13 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across ACEs loads, the prevalence of fair or poor health status was 9 to 29 percent lower among Michigan adults with at least one ACE and high social support than among those with low social support (depending on their ACEs load).

#### EXHIBIT 13. Fair or Poor Overall Health and Social Support



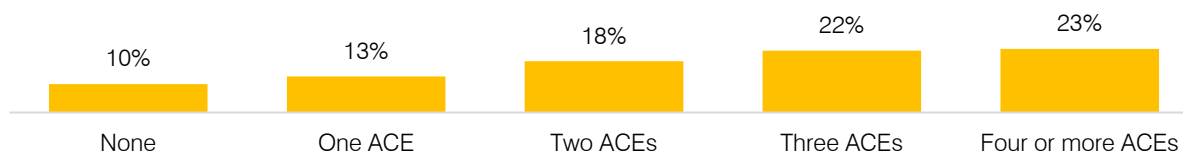
## Asthma

An asthma diagnosis at some point in a BRFSS respondents' lifetime is determined by their responses to the following questions: "Has a doctor, nurse, or other health professional ever told you that you had asthma?" and "Do you still have asthma?"

### Lifetime Asthma

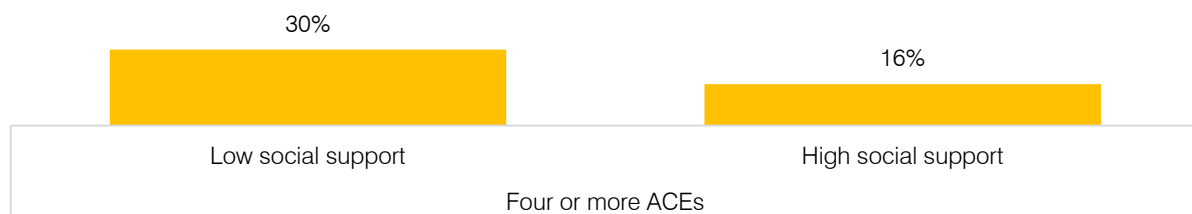
In 2016, 23 percent of Michigan adults with four or more ACEs had been diagnosed with asthma at some point in their lifetime, compared to only 10 percent of Michigan adults with no ACEs (Exhibit 14). Significantly more respondents with two, three, or four or more ACEs reported lifetime asthma than respondents with zero. The risk of lifetime asthma for adults with one or more ACEs is 1.7 times greater than for adults with none (Exhibit 5).

#### EXHIBIT 14. Lifetime Asthma by ACEs Load



As shown in Exhibit 15, the prevalence of asthma at some point in a person’s lifetime was 14 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across ACEs loads, the prevalence of diagnosed asthma at some point in a person’s lifetime was 9 to 14 percent lower among people with at least one ACE and high social support than among those with low social support (depending on their ACEs load). Among Michigan adults with four or more ACEs, significantly fewer individuals with high social support experienced asthma at any point in their lifetime than those with low social support.

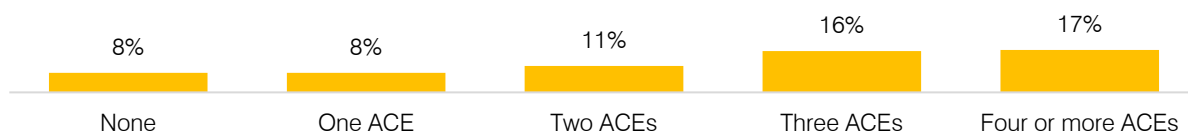
**EXHIBIT 15. Lifetime Asthma and Social Support**



## Current Asthma

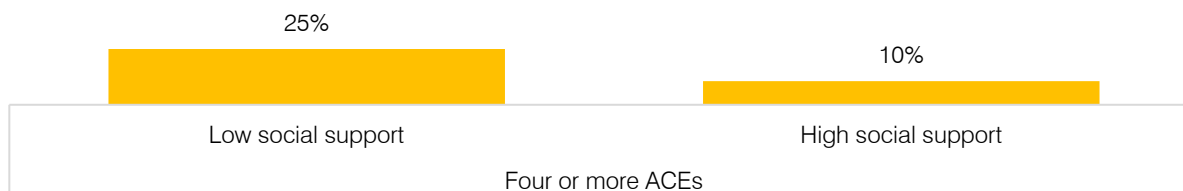
In 2016, 17 percent of Michigan adults with four or more ACEs currently had asthma, compared to only 8 percent of Michigan adults with no ACEs—a statistically significant difference (Exhibit 16). Significantly more respondents with three or four or more ACEs reported current asthma than respondents with zero or one ACE. The risk of current asthma for adults with one or more ACEs is nearly 1.6 times greater than for adults with none (Exhibit 5).

**EXHIBIT 16. Current Asthma by ACEs Load**



As shown in Exhibit 17, the prevalence of current asthma was 15 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across ACEs loads, the prevalence of current asthma was 12 to 15 percent lower among people with at least one ACE and high social support than among those with low social support (depending on their ACEs load). Among Michigan adults with four or more ACEs, significantly fewer individuals with high social support experienced current asthma than those with low social support.

#### EXHIBIT 17. Current Asthma and Social Support

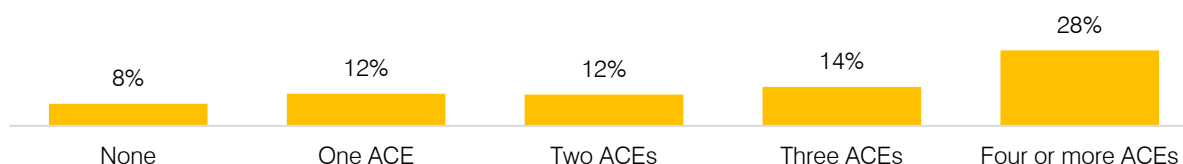


### Poor Physical Health

Poor physical health is determined by BRFSS respondents' answers to the following question: "Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?"

In 2016, 28 percent of Michigan adults with four or more ACEs reported poor physical health, compared to only 8 percent of Michigan adults with no ACEs (Exhibit 18). While there was no statistically significant difference in poor physical health by ACEs load, the risk of poor physical health for adults with one or more ACEs is nearly 1.3 times greater than for adults with none (Exhibit 5).

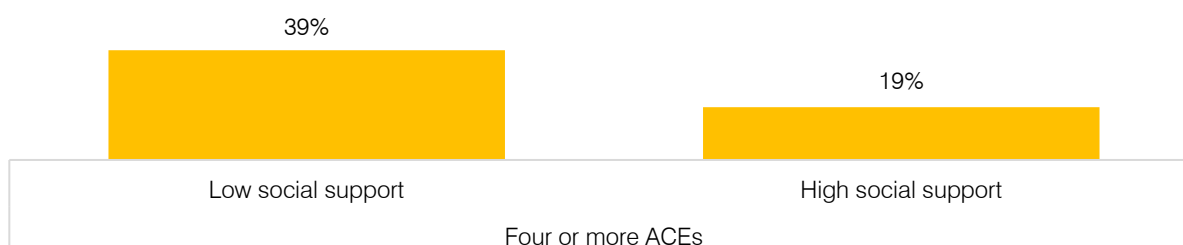
#### EXHIBIT 18. Poor Physical Health by ACEs Load



### Poor Physical Health and Social Support

As shown in Exhibit 19, the prevalence of poor physical health was 20 percent lower among adults with four or more ACEs and high social support than among adults with four or more ACEs and low social support. Across ACEs loads, the prevalence of poor physical health among people with at least one ACE and high social support was 10 to 20 percent lower than among those with low social support (depending on their ACEs load). Among Michigan adults with four or more ACEs, significantly fewer individuals with high social support experienced poor physical health than those with low social support.

#### EXHIBIT 19. Poor Physical Health and Social Support



## Conclusion

ACEs are widespread among Michigan adults and are a risk factor for numerous health risk behaviors and negative health outcomes. Yet there is hope. ACEs load contributes to—but does not guarantee—poor health outcomes later in life. Social support may help reduce the risk of negative health outcomes, even among Michigan adults with a high ACEs load. Therefore, policymakers, human services providers, communities, and families all have a role in creating safe and nurturing environments for children to prevent these types of experiences and in supporting children and adults who have already been affected by them.

## Appendix A: Social Support

Social support can take a variety of forms and is generally considered a protective factor against certain health risk behaviors and poor health outcomes among people with ACEs. The Michigan BRFS asked the following six questions about social support, which were adapted from Wisconsin's 2015 BRFS:

- How often did you feel that you belonged at your high school?
- How often did you feel supported by your friends?
- How often were there at least two adults, other than your parents, who took a genuine interest in you?
- How often did you feel that you were able to talk to your family about your feelings?
- How often did you enjoy participating in your community's traditions?
- How often did you feel your family stood by you during difficult times?

Like ACEs load, this report focuses on the cumulative effect of social support (low vs. high) on health outcomes. Social support is a summary score of BRFS respondents' answers to the above questions, where each option is assigned a score:

- Never = zero points
- Rarely = one point
- Sometimes = two points
- Usually = three points
- Always = four points

Respondents who scored zero to 14 on these questions were categorized as having low social support, while those who scored between 15 to 24 points were categorized as having high social support.

Like risk, statistically speaking, we **cannot** say that “high social support decreased the prevalence of a given condition” because we did not adjust for potential confounding variables—other factors which may have contributed to the decrease. However, we **can** say that “the prevalence of several health conditions was lower among people with fewer ACEs and high social support than among those with four or more ACEs and low social support.” This difference varied depending on a respondent's ACEs load.

## Appendix B: 2016 MiBRFS Methods

The Michigan Behavioral Risk Factor Survey (MiBRFS) is an annual, statewide telephone survey of Michigan adults aged 18 years and older that is conducted through a collaborative effort between the Population Health Surveillance Branch (PHSB) of the Centers for Disease Control and Prevention (CDC), the Michigan State University Institute for Public Policy and Social Research (IPPSR), and the Michigan Department of Health and Human Services (MDHHS). Michigan Behavioral Risk Factor Surveillance System (MiBRFSS) data contribute to the CDC Behavioral Risk Factor Surveillance System (BRFSS) that is conducted within every state, the District of Columbia, and several U.S. territories.

In 2016, the MiBRFS collected data from both landline and cell phone respondents. The sample of landline telephone numbers was selected using a list-assisted, random-digit-dialed methodology with a disproportionate stratification based on phone bank density, and whether or not the phone numbers were directory listed. The sample of cell phone numbers was randomly selected from dedicated cellular telephone banks sorted on the basis of area code and exchange.

A weighting methodology known as iterative proportional fitting or raking was used in 2016 to allow for the incorporation of cell phone data and to improve the accuracy of prevalence estimates based on MiBRFS data. Estimates based on this weighting methodology were weighted to adjust for the probabilities of selection and a raking adjustment factor that adjusted for the distribution of the Michigan adult population by telephone source (landline or cell phone), detailed race/ethnicity, education level, marital status, age by gender, gender by race/ethnicity, age by race/ethnicity, and renter/owner status.

Due to the BRFSS methodology changes that were implemented in 2011, 2016 MiBRFS estimates should only be compared to estimates from 2011-2016 and not to estimates from years prior to 2011.

Prevalence estimates and asymmetric 95% confidence intervals (95% CIs) were calculated using SAS-Callable SUDAAN (version 11.0.1), a statistical computing program that was designed for analyzing data from multistage sample surveys.<sup>1</sup> If the 95% CIs for two estimates from different subpopulations or survey years did not overlap, they were considered to be statistically different. Unless otherwise specified, respondents who answered that they did not know or refused to answer were not included in the calculation of estimates. For comparison purposes, the median estimates from all 50 states and the District of Columbia were used as national estimates.

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<sup>1</sup> Research Triangle Institute. 2012. *SUDAAN Language Manual, Volumes 1 and 2, Release 11*. Research Triangle Park, NC: Research Triangle Institute.



## Sample Results for the 2016 MiBRFS

The total sample size for the 2016 MiBRFS was 12,024 (landline = 4,797; cell phone = 7,227). The response rate for the landline portion of the 2016 MiBRFS was 52.2 percent, while the response rate for the cell phone portion of the survey was 45.8 percent. The overall weighted response rate (landline and cell phones combined) for the 2015 MiBRFS was 49.6 percent. The overall weighted U.S. median response rate for 2016 was 47.0 percent.<sup>2</sup>

This appendix was provided by the MDHHS. More information and reports can be found at [www.michigan.gov/brfs](http://www.michigan.gov/brfs).

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<sup>2</sup> Centers for Disease Control and Prevention. June 29, 2017. *2016 Summary Data Quality Report*. Accessed October 2, 2019. [https://www.cdc.gov/brfss/annual\\_data/2016/pdf/2016-sdqr.pdf](https://www.cdc.gov/brfss/annual_data/2016/pdf/2016-sdqr.pdf)

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